



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/691,052
Applicant : Milliren, Charles M.
Filed : October 22, 2003
Title : VISCOELASTIC FOAM LAYER AND COMPOSITION
Examiner : John M. Cooney
Docket No. : 36211
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Commissioner for Patents
P.O. Box 1450
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Amendment "D" Under Rule 1.116

Sir:

This Amendment is in response to the Office action mailed November 30, 2006.

The period for reply is set to expire on February 28, 2006.

Please amend the above-identified application as follows.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 11 of this paper.

I hereby certify that this correspondence is being facsimile transmitted via facsimile number 571-273-8300 to:
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below.

Steven J. Solomon

Name of Attorney for Applicant(s)


Signature of Attorney

February 16, 2006
Date

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A semi-rigid viscoelastic foam made from a Part A composition and a Part B composition, said Part A composition comprising 20-50 weight percent isocyanate (NCO), said Part B composition comprising ~~at least 20 parts by weight of amine-based polyether polyol having a propylene oxide extended tip, 1-15 parts propylene oxide-extended monoethanolamine-based polyol, 6-25 parts propylene oxide-extended triethanolamine-based polyol, 22-40 parts propylene oxide-extended ethylenediamine-based polyol,~~ at least 10 parts by weight of an additional polyol selected from the group consisting of filled polyether polyols and unfilled polyether polyols, and 0.4-4 parts by weight catalyst, said Part A and Part B compositions being combined to provide said semi-rigid viscoelastic foam.

Claim 2 (currently amended): A semi-rigid viscoelastic foam made from a Part A composition and a Part B composition, said Part A composition comprising 20-50 weight percent isocyanate (NCO), said Part B composition comprising ~~at least 20 parts by weight of amine-based polyether polyol having a propylene oxide extended tip, 1-15 parts propylene oxide-extended monoethanolamine-based polyol, 6-25 parts propylene oxide-extended triethanolamine-based polyol, 22-40 parts propylene oxide-extended ethylenediamine-based polyol,~~ at least 10 parts by weight of an additional, tri-functional polyether polyol, and 0.4-4 parts by weight catalyst, said Part A and Part B

compositions being combined to provide said semi-rigid viscoelastic foam.

Claim 3 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, having an index of 80-115.

Claim 4 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, having an index of about 90-100.

Claim 5 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, said Part B composition further comprising about 3 parts by weight water.

Claim 6 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, said Part B composition further comprising about 6 parts by weight black paste.

Claim 7 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, said isocyanate in said Part A composition being present in the form of 4,4'-MDI.

Claim 8 (previously presented): A semi-rigid viscoelastic foam according to claim 7, said 4,4'-MDI being present in said Part A composition in an amount sufficient to provide an isocyanate (NCO) concentration of about 33.6 percent by weight.

Claim 9 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, said isocyanate in said Part A composition being present in the form of an

allophanate-modified MDI prepolymer, said part A composition having an isocyanate (NCO) concentration of about 20-30 percent by weight.

Claim 10 (currently amended): A semi-rigid viscoelastic foam according to claim 1 or 2, ~~said amine-based polyol in said Part B composition being a mixture of polyols comprising monoethanolamine based polyol~~ being present in an amount of less than 10 parts by weight, said triethanol amine based polyol being present in an amount of greater than 10 ~~[[30]]~~ parts by weight, and said ethylenediamine based polyol being present in an amount of 16-36 parts by weight.

Claim 11 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, said catalyst comprising amine catalyst in an amount of 0.4-2.5 parts by weight, delayed action catalyst in an amount of 0-1 parts by weight, and trimer catalyst in an amount of 0-1 parts by weight.

Claim 12 (previously presented): A semi-rigid viscoelastic foam according to claim 11, said amine catalyst being tertiary amine catalyst, said delayed action catalyst being a combination delayed action catalyst, said trimer catalyst being a quaternary ammonium salt trimer catalyst.

Claim 13 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, said additional polyol being a glycerin based polyether polyol.

Claim 14 (previously presented): A semi-rigid viscoelastic foam according to claim 2, said tri-functional polyether polyol being a non-amine based polyether polyol.

Claim 15 (currently amended): A method of making a viscoelastic foam comprising the steps of:

- a) providing a Part A composition comprising 20-50 weight percent isocyanate;
- b) providing a Part B composition comprising ~~at least 20 parts by weight amine-~~
~~based polyether polyol having a propylene oxide-extended tip, 1-15 parts propylene~~
~~oxide-extended monoethanolamine-based polyol, 6-25 parts propylene oxide-extended~~
~~triethanolamine-based polyol, 22-40 parts propylene oxide-extended ethylenediamine-~~
~~based polyol,~~ at least 10 parts by weight of an additional polyol selected from the group consisting of filled polyether polyols and unfilled polyether polyols, and 0.4-4 parts by weight catalyst; and
- c) combining said Part A and Part B compositions to provide a semi-rigid viscoelastic foam having an index of 70-130.

Claim 16 (currently amended): A method of making a viscoelastic foam comprising the steps of:

- a) providing a Part A composition comprising 20-50 weight percent isocyanate;
- b) providing a Part B composition comprising ~~at least 20 parts by weight amine-~~
~~based polyether polyol having a propylene oxide-extended tip, 1-15 parts propylene~~
~~oxide-extended monoethanolamine-based polyol, 6-25 parts propylene oxide-extended~~
~~triethanolamine-based polyol, 22-40 parts propylene oxide-extended ethylenediamine-~~

based polyol, at least 10 parts by weight of an additional, tri-functional polyether polyol, and 0.4-4 parts by weight catalyst; and

c) combining said Part A and Part B compositions to provide a semi-rigid viscoelastic foam having an index of 70-130.

Claim 17 (previously presented): A method according to claim 15 or 16, said semi-rigid viscoelastic foam having an index of 90-100.

Claim 18 (previously presented): A method according to claim 15 or 16, said Part B composition further comprising about 3 parts by weight water.

Claim 19 (previously presented): A method according to claim 15 or 16, said Part B composition further comprising about 6 parts by weight black paste.

Claim 20 (previously presented): A method according to claim 15 or 16, said isocyanate in said Part A composition being present in the form of 4,4'-MDI.

Claim 21 (original): A method according to claim 20, said 4,4'-MDI being present in said Part A composition an amount sufficient to provide an isocyanate (NCO) concentration of about 33.6 percent by weight in said Part A composition.

Claim 22 (original): A method according to claim 15 or 16, said isocyanate in said Part A composition being present in the form of an allophanate-modified MDI

prepolymer.

Claim 23 (currently amended): A method according to claim 15 or 16, said ~~amine-based polyol in said Part B composition being a mixture of polyols comprising~~ monoethanolamine based polyol being present in an amount of less than 10 parts by weight, said triethanol amine based polyol being present in an amount of greater than 10 ~~[-30]]~~ parts by weight, and said ethylenediamine based polyol being present in in an amount of 16-36 parts by weight.

Claim 24 (previously presented): A method according to claim 15 or 16, said catalyst comprising amine catalyst in an amount of 0.4-2.5 parts by weight, a delayed action catalyst in an amount of 0-1 parts by weight, and a trimer catalyst in an amount of 0-1 parts by weight.

Claim 25 (currently amended): A method according to claim 24, said amine ~~catalysts~~ catalyst being tertiary amine ~~catalysts~~ catalyst, said delayed action catalyst being a combination delayed action amine/delayed action tin catalyst, and said trimer catalyst being a quaternary ammonium salt trimer catalyst.

Claim 26 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, said Part B composition further comprising 3-15 parts by weight black paste.

Claim 27 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, having an index of 70-130.

Claim 28 (currently amended): A semi-rigid viscoelastic foam according to claim 1 or 2, said Part B composition having at least 40 parts by weight total amine-based polyether polyol, wherein the amounts of all polyether polyols in said Part B composition sum to 100 parts by weight.

Claim 29 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, said foam being recoverable following a high energy impact.

Claim 30 (previously presented): A semi-rigid viscoelastic foam according to claim 29, said foam being substantially 100% recoverable following said high energy impact.

Claim 31 (previously presented): A semi-rigid viscoelastic foam according to claim 1 or 2, wherein on impact with a flat circular impactor having a 4-inch diameter according to test method ASTM F2040, a sample of said foam measuring 5.5" x 5.5" x 1" (thick) exhibits breakthrough acceleration in the range of 100 to 150 g's for an impact speed of 2-6 meters/second.

Claim 32 (currently amended): A semi-rigid viscoelastic foam, said foam being made from a Part A composition and a Part B composition, said Part A composition

comprising 20-50 weight percent isocyanate (NCO), said Part B composition comprising water, at least one catalyst and each of the following, all in parts by weight:

1-15 parts propylene oxide-extended monoethanolamine-based polyol,

6-25 parts propylene oxide-extended triethanolamine-based polyol,

22-40 parts propylene oxide-extended ethylenediamine-based polyol,

0-50 parts filled polyol, and

0-50 parts unfilled polyol;

wherein said Part B composition includes at least one of said filled or unfilled polyols.

Claim 33 (canceled)

Claim ³³34 (currently amended): A semi-rigid viscoelastic foam according to claim 32 ~~[[or 33]]~~, said filled and unfilled polyols each being glycerin-based and at least tri-functional.

Claim ³⁴35 (previously presented): A semi-rigid viscoelastic foam according to claim 34, said part B composition comprising 20-30 parts by weight unfilled polyol and 20-30 parts by weight filled polyol.

Claim ³⁵36 (previously presented): A semi-rigid viscoelastic foam according to claim ³⁴35, said foam having an index of 80-115.

Claim 37 (currently amended): A semi-rigid viscoelastic foam according to claim

1, 2, or 32 [[or 33]], said part B composition comprising 40-60 parts by weight total amine-based polyol out of 100 parts by weight total polyols.

Replaced

Claim 38 (previously presented): A semi-rigid viscoelastic foam according to claim 37, said part B composition comprising 20-30 parts by weight unfilled polyol and 20-30 parts by weight unfilled polyol.

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Claim ~~39~~ (previously presented): A semi-rigid viscoelastic foam according to claim ³⁷~~38~~, said filled and unfilled polyols each being glycerin-based and at least tri-functional.

Claim 40 (canceled)